NORMALIZATION

**Types Of Normalization**

* First Normal Form
* Second Normal form
* Third Normal form
* BCNF
* Fourth Normal form
* Fifth Normal form

**First Normal Form (1NF)** <https://www.geeksforgeeks.org/normal-forms-in-dbms/>

* Each table cell of 1NF have single value and all columns must be unique names. (gfg)

Example: we have 1 table od student data of student\_id, student\_name, subject. (stn)

Before 1NF

|  |  |  |
| --- | --- | --- |
| Student\_id | Student\_name | subject |
| 101 | Std1 | Math,English |
| 102 | Std2 | math |

**After 1NF**

|  |  |  |
| --- | --- | --- |
| Student\_id | Student\_name | subject |
| 101 | Std1 | Math |
| 101 | Std1 | English |
| 102 | Std2 | math |

**Second Normal form (2NF)** <https://www.geeksforgeeks.org/normal-forms-in-dbms/>

* The second normal form is non key attribute depend on entire primary key. That mean the each column directly related to primary key column and not other column.(gfg)

Example: we have 3 table (stn)

1. student\_id, student\_name, branch
2. subject\_id, subject\_name
3. student\_id, subject\_id, marks, teacher\_name

(student\_id and subject\_id these 2 are primary key)

|  |  |  |
| --- | --- | --- |
| student\_id | student\_name | branch |
| 1 | Std1 | Cse |
| 2 | Std2 | Mech |

|  |  |
| --- | --- |
| Subject\_id | Subject\_name |
| 1 | C lang |
| 2 | DSA |
| 3 | OPs |

|  |  |  |  |
| --- | --- | --- | --- |
| Student\_id | Subject\_id | marks | Teacher\_name |
| 1 | 1 | 70 | Miss. C |
| 1 | 2 | 82 | Miss. D |
| 2 | 1 | 65 | Miss. ops |

**After applying 2NF**:

Updated subject table

|  |  |  |
| --- | --- | --- |
| Subject\_id | Subject\_name | Teacher\_name |
| 1 | C lang | Miss. C |
| 2 | DSA | Miss. D |
| 3 | OPs | Miss. ops |

Updated score table

|  |  |  |
| --- | --- | --- |
| Student\_id | Subject\_id | marks |
| 1 | 1 | 70 |
| 1 | 2 | 82 |
| 2 | 1 | 65 |

**Third Normal form (3NF)** <https://www.geeksforgeeks.org/normal-forms-in-dbms/>

* The 3NF build on 2NF by requiring all non key attributes those are independent with each column. Each column directly related to primary key and not to any other column in that table.

Example : we have 1 table the column name is customerid,customer\_name, customer\_city, customer\_state.

|  |  |  |  |
| --- | --- | --- | --- |
| customerid | customer\_name | customer\_city | customer\_state |
| 1 | Cs1 | nagpur | Maharastra |
| 2 | Cs2 | pune | Maharastra |
| 3 | Cs3 | surat | Gujrat |

**After 3NF**: we have to create 2 table

1. customerid,customer\_name, customer\_city,
2. customer\_city, customer\_state.

|  |  |
| --- | --- |
| customer\_city | customer\_state |
| nagpur | Maharastra |
| pune | Maharastra |
| surat | Gujrat |

Table1 Table2

|  |  |  |
| --- | --- | --- |
| customerid | customer\_name | customer\_city |
| 1 | Cs1 | nagpur |
| 2 | Cs2 | pune |
| 3 | Cs3 | surat |

**Boyce-Codd Normal Form (BCNF)** <https://www.geeksforgeeks.org/normal-forms-in-dbms/>

* BCNF is the stricter from od 3nf tat will be each determinant in table is candidate key. Thery each non key attribute in bcnf is dependent on candidate key.

Example: we have a table of professorid, department, course

|  |  |  |
| --- | --- | --- |
| professorid | department | course |
| 1 | Comp sci | DS |
| 2 | Math | Calculus |

**After bcnf**

Table 1 of professor Table 2 course

|  |  |
| --- | --- |
| professorid | department |
| 1 | Comp sci |
| 2 | Math |

|  |  |  |
| --- | --- | --- |
| Coursed | Course | department |
| 101 | DS | Comp sci |
| 102 | Calculus | Math |

**Fourth Normal form (4NF)** <https://www.geeksforgeeks.org/normal-forms-in-dbms/>

* The 4NF is the refinment of BCNF that ensure table does not contain any multi- valued dependencies.

Example: we have table that has

|  |  |  |
| --- | --- | --- |
| Std\_id | Course\_id | Department |
| 1 | C101 | D1 |
| 1 | C102 | D2 |
| 2 | C101 | D1 |

**After 4nf**

Student-course table1 student-department table2

|  |  |
| --- | --- |
| Std\_id | Course\_id |
| 1 | C101 |
| 1 | C102 |
| 2 | C101 |

|  |  |
| --- | --- |
| Std\_id | Department |
| 1 | D1 |
| 1 | D2 |
| 2 | D1 |

**Fifth Normal form (5NF)** <https://www.geeksforgeeks.org/normal-forms-in-dbms/>

* The 5NF is the highest level of normalization and it involve decomposing table to similar table to remove data and improve data integrity.

Example:

|  |  |  |
| --- | --- | --- |
| Pro\_id | Emp\_id | Task\_id |
| P1 | E1 | T1 |
| P1 | E2 | T2 |
| P3 | E1 | T3 |

**After 5NF:**

All ids with separate table.

Project-employee table employee-task table

|  |  |
| --- | --- |
| Emp\_id | Task\_id |
| E1 | T1 |
| E2 | T2 |
| E1 | T3 |

|  |  |
| --- | --- |
| Pro\_id | Emp\_id |
| P1 | E1 |
| P1 | E2 |
| P3 | E1 |

Project-task-table

|  |  |
| --- | --- |
| Pro\_id | Task\_id |
| P1 | T1 |
| P1 | T2 |
| P3 | T3 |

https://www.geeksforgeeks.org/normal-forms-in-dbms/